



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

LR

| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO.     |
|--|-------------|----------------------|---------------------|----------------------|
| 10/814,921   | 03/31/2004  | John F. Vetelino     | 1-24954             | 6349                 |
| 4859   | 7590        | 03/08/2006           | EXAMINER            |                      |
| MACMILLAN SOBANSKI & TODD, LLC<br>ONE MARITIME PLAZA FOURTH FLOOR<br>720 WATER STREET<br>TOLEDO, OH 43604-1619 |             |                      |                     | AGUIRRECHEA, JAYDI A |
|  |             | ART UNIT             |                     | PAPER NUMBER         |
|  |             | 2834                 |                     |                      |

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |
|------------------------------|------------------------|---------------------|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |
|                              | 10/814,921             | VETELINO, JOHN F.   |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |
|                              | Jaydi A. Aguirrechea   | 2834                |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 19 December 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-3,5-15 and 18-25 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-3,5-15 and 18-25 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 19 December 2005 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                     | Paper No(s)/Mail Date. _____ .  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____ .                                  |

## DETAILED ACTION

### *Drawings*

1. The drawings were received on 12/19/2005. These drawings are accepted.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 5, 15 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Krishnaswamy et al. (US 5233259).

Krishnaswamy discloses an acoustic wave sensor comprising: a substrate formed from a piezoelectric crystal (50) with a crystallographic orientation, said substrate having a sensing surface and a reference surface, said reference surface being opposite from said sensing surface, said sensing surface adapted to be immersed in an environment containing a measurand of interest; and a pair of electrodes (54) deposited upon said substrate reference surface, said electrodes separated by a gap and oriented upon said reference surface relative to said crystallographic orientation of said substrate such that upon said electrodes generating a lateral electric field therebetween, said lateral electric field induces only a transverse shear mode acoustic wave within said substrate (column 3, lines 21-25).

It has been held that the recitation that an element is “adapted to” perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138.

With regards to claim 2, the piezoelectric crystal substrate is made of lithium niobate (col. 2, line 55).

With regards to claim 5, Krishnaswamy is silent with regards to the position of the electrodes with respect to the crystallographic axis of the substrate. However, the electrodes are formed with parallel facing edges and these electrodes generate a lateral electric field inside the piezoelectric film and excite transverse shear mode acoustic waves. Therefore, the electrodes must be formed parallel to the crystallographic x-axis since the invention shows the same structure and performs in the same way as described by the applicants of the instant invention.

With regards to claim 15, the method of making the device comprising the steps of providing a piezoelectric crystal, forming the crystal into a substrate and depositing a pair of electrodes to generate a lateral electric field is inherent in the device itself as described by Krishnaswamy.

With regards to claim 23, Krishnaswamy discloses the claimed limitations as explained above and the piezoelectric crystal being formed from lithium niobate.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 3, 6-11 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy.

With regards to claim 3, Krishnaswamy discloses the claimed invention as explained in item 4. However, Krishnaswamy fails to disclose the substrate being formed from an AT cut quartz.

Larue discloses a piezoelectric sensor having a substrate form from an AT cut quartz. The use of an AT cut quartz as a substrate in piezoelectric sensors is known and old. The properties of the AT cut quartz have been widely studied and show many desirable characteristics such as elasticity, density and low cost. Therefore, it would have been obvious at the time of the invention was made to use an AT cut quartz as a substrate for the purpose of minimizing the cost of the sensor.

It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

6. With regards to claim 6, Krishnaswamy discloses the electrodes formed from metal. But fails to disclose the metal being specifically one of gold, platinum, palladium, silver, copper and aluminum. All these metals are known to be used as electrodes since they provide resistance to oxidation, high conductivity properties and therefore provide better performance of the device where they are used. Therefore, it would have been obvious at the time of the invention was made to use any of the metals disclosed for the purpose of improving the characteristics of the device.

7. With regards to claim 7, Krishnaswamy discloses the electrodes formed from a metal.

However, fails to disclose an adhesive layer formed from one of the group of chromium, zirconium and titanium disposed between the electrodes and the surface of the substrate. It is known in the art the use of electrodes having a double layer structure composed of a layer of an

adhesive metal, such as chromium or titanium, and a second layer of a metal suitable for soldering or bonding with an external element, such as gold or copper. In Krishnaswamy's reference, specifically in the background of the invention, Krishnaswamy discloses the use of a second metal layer formed between the piezoelectric and the electrodes.

Therefore, it would have been obvious at the time of the invention was made to use a double layer electrode to guarantee and assure the proper connection between the electrode and the surface.

8. With regards to claims 8-11, Krishnaswamy discloses optimum values for the dimensions of the gap G but fails to disclose the specific values of the diameter and thickness of a circular shaped substrate.

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to provide a gap between electrodes having a size of 1.0-4.0mm, and the thickness of the electrodes, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been an obvious matter of design choice to change the shape of the substrate, since the applicant has not disclosed that having a circular shape solves any problem or is for a particular reason. It appears that the claimed invention would perform equally well with the rectangular-shaped substrate disclosed by Krishnaswamy.

9. With regards to claim 24, the method limitations are inherent in the disclosure of Krishnaswamy as explained in items 4 and 8 (Claim 7).

10. With regards to claim 25, the method limitations are rejected under the same grounds of rejection as those applied to claim 6 and disclosed in item 7 (claim 6).

11. Claims 12-14 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy in view of Muller (US 4361026).

Regarding claims 12-14, Krishnaswamy discloses the claimed invention as disclosed in items 1 and 10, but fails to disclose the sensor including a layer of a bent material deposited upon said sensing surface, said sorbent material deposited upon the sensing surface, the sorbent material being selected to absorb a measurand contained within the environment being sensed, said absorbed measurand changing an operative characteristic of the sensor such that the change in said operative characteristic can be correlated with said measurand, wherein such characteristic is the resonant frequency of the sensor.

Muller discloses the sensor including a layer of a bent material deposited upon said sensing surface, said sorbent material deposited upon the sensing surface, the sorbent material being selected to absorb a measurand contained within the environment being sensed, said absorbed measurand changing an operative characteristic of the sensor such that the change in said operative characteristic can be correlated with said measurand, wherein such characteristic is the resonant frequency of the sensor.

Muller's invention has the purpose of providing a precise fluid sensing unit that is small, easily integrated, and relatively inexpensive to fabricate. Muller discloses a fluid sensing system and techniques for sensing the presence of gases, vapors and liquids. The sensing member has a physical characteristic that varies the waves when in the presence of the specific fluid being detected and by measuring the variation. Therefore, it would have been obvious at the time of the invention was made to use a sorbent material disposed on the sensing surface of the sensor for the purpose of identifying the presence of gases, vapors and/or liquids as disclosed by Muller.

With regards to claim 18, Krishnaswamy discloses the limitations as disclosed above in item 4. Regarding the limitation of a variable voltage supply connected to the sensor an operative to cause the electrodes to generate a lateral electric field; this limitation is inherent in the disclosure of Krishnaswamy. Krishnaswamy discloses a voltage potential in column 3, lines 42-45. The use of a variable voltage supply is inherent and being operative to sweep through a predetermined frequency range and the device electrically connected to the sensor and operative to detect the resonance frequency of the sensor is disclosed by the combination of Krishnaswamy in view of Muller.

With regards to claim 19, the combination of Krishnaswamy and Muller discloses the claimed limitations as explained in items 8 and 11 above.

12. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnaswamy in view of Muller.

The combination of Krishnaswamy and Muller discloses the claimed limitations as explained in items 8 and 11 above but fails to disclose the environment being a liquid and the measurand is the viscosity, permittivity or the conductivity of the liquid.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use the disclosed sensor to measure the viscosity of the liquid, since the patented structure is not limited to any specific measurand and the structure is the same as the one claimed. Selecting a specific environment and measurand would amount to a recitation of the intended use of the patented invention, without resulting in any structural difference between the claimed invention and the structure disclosed by the combination of Krishnaswamy and Muller, and therefore fails to patentably distinguish the claimed invention from the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

***Response to Arguments***

13. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jaydi A. Aguirrechea whose telephone number is 571-272-2018. The examiner can normally be reached on M-Th 9-7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren E. Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JAA  
2/22/06

DARREN SCHUBERG  
SUPERVISORY PATENT EXAMINER  
TECHNICAL DIVISION 1200